ARCTIC (H.K.) Ltd

Life Expectancy Report

Representative Test Model : P9 Max

◎ L_{10} Expectancy: 30,000 hours minimum @ fan rated voltage and the temperature of 40℃

According to the equation for Weibull distribution, MTTF ≒ 7×L_{10} = 210,000 hours

And we rely on a zero failure Weibull test strategy and accelerated testing technique, to determine the total test time (t) for verifying the above life estimation by the equations,

$$t = 1.036 \times MTTF \times [(B_{r;c}) \div n]^{0.91} \div A_F, \text{ and } A_F = 2^{(Ts-Tu)/10}$$

where, ($B_{r;c}$) is Poisson distribution factor with the failure number of r equal to 0 and the decimal confidence level of c equal to 0.90(90%), and

Stress/Elevated Temperature Ts (℃)	Unstress Temperature Tu (℃)	Acceleration Factor A_F	Quantity of Test Devices n (pcs)	Possion Distribution Factor $B_{r;c}$	Required test time with zero failure t (hours)	Actual test time with zero failure t (hours)	Verified MTTF (hours)	Verified L_{10} (hours)
75	40	11.31	40	2.303	1,431	1,431.0	209,929	29,990

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2024-9-18 12:00 AM	2024-11-16 3:00 PM	☐ In process	☐ In process (exceed requested)	☑ Termination	1431.0

INSPECTION CRITERIA :	Temperature for MTTF Estimation (℃)	Acceleration Factor A_F	Estimated MTTF (hours)	Estimated L_{10} (hours)
1.Current (Icc) variation from nominal : +/- 30%	30	22.63	419,858	59,980
2.Rotational Speed variation from nominal : +/- 30%	40	11.31	209,929	29,990
3.Acoustic variation : +/- 3 dBA	50	5.66	104,964	14,995
4.Inspecting external if there is any defects in fan	60	2.83	52,482	7,497
5.Using the lowest voltage to inspect if the fan still operates	70	1.41	26,241	3,749
	80	0.71	13,121	1,874
	90	0.35	6,560	937

Herewith , we could assume as right on the basis of above test result. Besides, if the actual test time exceed the required, it comes out that those fans' L10 expectancy and MTTF are greater than the warrant.

Time-out for function test or others (hours)	Issued Date	Approved By	Review	Reported By
	2024-11-18			Gaurav Jeandani